B.E. Electrical Sem - VII (R) DEC. 2018

Paper / Subject Code: 42201 / Power System Operation & Control

1/2.

B.E (Electrical) - Sem VII - CBSGS - Power System op. & Control — 19.11.18. Duration: 3 Hours Total Marks : 80

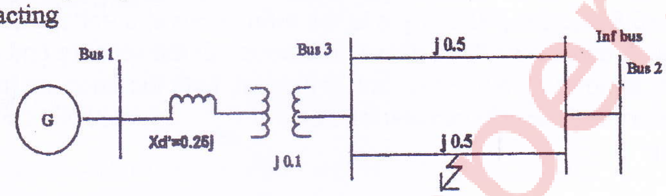
NOTE

1. Question number 1 is compulsory
2. Attempt any three from the remaining
3. Figures to right indicates full marks
4. Assume suitable data if necessary and mention the same

1. Attempt any four of the following :- 20

a) Explain why frequency control loop and voltage control loop are not interacting 05

b) 05



For the system shown if fault occurs at the middle of the line. Find transfer reactance between bus 1 and 2 by **NODE ELIMINATION** technique only

c) Define power system stability and classify it on the basis of nature of disturbance 05

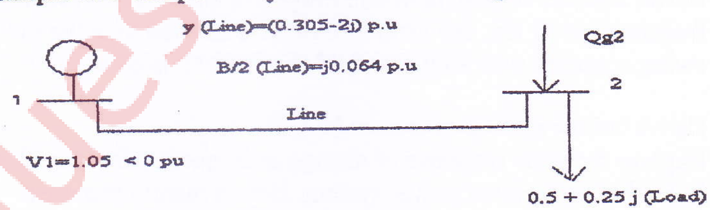
d) State assumptions made in transient stability studies 05

e) What are the characteristics of Ybus matrix, also explain the advantages of using Ybus matrix for load flow studies 05

2. 20

a) Explain Y_{BUS} formation by singular transformation 10

b) A simple two-bus power system is shown in fig 10



$|V_2|$=1.0 p.u (Bus 2 is PV bus). Obtain δ_2 and Q_{g2} at the end of first iteration of N-R method.

3. 20

a) The fuel cost functions for three thermal plant in Rs/h are given by 10

$$C_1=500+5.3P_1+0.004P_1^2$$
$$C_2=400+5.5P_2+0.006P_2^2$$
$$C_3=200+5.8P_3+0.009P_3^2$$

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Where P_1, P_2 and P_3 are in MW. The total load P_D is 975 MW with following generator limits (in MW)

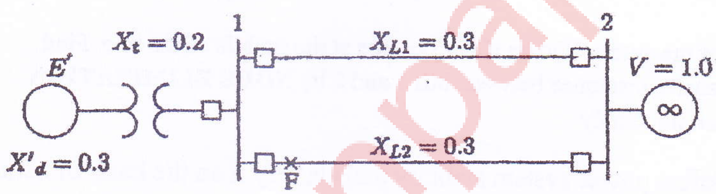
$$200 \le P_1 \le 450$$
$$150 \le P_2 \le 350$$
$$100 \le P_3 \le 225$$

Find the optimal dispatch and the total cost in Rs/h

b) Derive formula for Bmn coefficients in transmission loss formula — 10

4. — 20

a) A 50 Hz synchronous generator having inertia constant H= 5 MJ/MVA and a direct axis transient reactance xd'=0.3 p.u is connected to an infinite bus through a purely reactive circuit as shown in figure below. Reactances are marked on the diagram on a common system base. The generator is delivering real power Pe=0.8 pu and Q=0.074 p.u to the infinite bus at a voltage of V=1 p.u. A temporary three phase fault occurs at the sending end of the line at point F. When the fault is cleared, both the lines are intact. Determine the critical clearing angle and the critical fault clearing time — 10



b) A syncronous generator having H= 8 MJ/MVA is connected to an infinite bus and supplying power of 1 pu with initial power angle as 25 degree. Assume three phase fault occurring at t=0 and cleared at t=0.2 sec. The power equations expressed in pu are as under — 10

Power transfer in pre-fault condition=2.5 sin δ

Power transfer in during-fault condition=0.6 sin δ

Power transfer in post-fault condition=1.5 sin δ. The system frequency is 50 Hz, use Modified Euler's method to solve the swing equation with step size 0.05 till the fault is cleared

5. — 20

a) Derive turbine speed governor model — 10

b) Explain dynamic response of change in frequency for step change in load of an isolated power system. How dynamic response changes with integral control action — 10

6. Write short notes on (any two) — 20

a) power pool and its advantages and disadvantages — 10

b) Surge impedance and surge impedance loading — 10

c) AGC in restructured power system — 10
